



## Practical Oceanographic Research

XAS NS 226 (4 credits)

### Course Catalog Description (max. 40 words):

Introduction to oceanographic research. Design a collaborative, hypothesis-driven project following the scientific process. Collect original data. Conduct analysis and interpretation, then prepare a written report and oral presentation.

**Instructor(s):** Sea Education Association Oceanography Faculty

**Location:** SEA campus in Woods Hole, MA and aboard SEA sailing school vessel at sea.

**Prerequisites:** Admission to the SEA Semester.

### Course Philosophy and Approach:

Research topics appropriate to the PIPA scientific focus and cruise track have been identified prior to this course. During the initial two-week shore component, student research teams will select a topic and develop a brief research proposal (Introduction and Methods) for their scientific project. A critical educational goal of the Practical Oceanographic Research course is the transfer of “what sounded good on shore” to “what really works at sea,” and the evolution of these scientific projects to the real world will occupy much of our time while underway. Intellectual and logistical flexibility is the rule of the day.

Students will complete their oceanographic research projects under the guidance of the Chief Scientist aboard the vessel. Essential project components include the collection, analysis and presentation of data; a research report will be written to summarize findings and conclusions.

This course consists of 10 discussion/mentoring sessions (1.5 hours each), and a minimum of 42 hours of supervised laboratory watch participation (active learning/laboratory) across ~36 underway days at sea.

### Learning Outcomes:

1. Recognize and employ the scientific method through development and completion of a collaborative research project.
2. Demonstrate ability to critically analyze and interpret authentic oceanographic data.
3. Demonstrate ability to generate clear visual representations of oceanographic data.
4. Participate and contribute as an essential member of a research team.

### Evaluation:

Research Proposal	20%
Data Discussions (Participation and Assignments)	20%
Revised Introduction and Methods	10%
Draft Results	10%
Written Report	40%

**Assignments:**

Research Proposal: A brief research proposal (Introduction and Methods) will be prepared during the initial two-week shore component. Revisions will be necessary based on method testing at sea.

Data Discussions: Two Data Discussion Sessions will guide the progress of data analysis. For the first session, research teams will be required to retrieve relevant data from current cruise archives and plot station locations. For the second session, research teams will generate two figures that begin to address the hypothesis being tested.

Revised Introduction and Methods Sections: Revisions of Proposal text will be necessary based on method testing at sea.

Draft Results: Research teams will draft a Results section for their final manuscript, including text, figure, and captions.

Written Report: Research teams will produce a written report following a standard format. The final reports will be archived at SEA.

**Expectations and Requirements:**

- Punctual attendance is required at every class meeting.
- Active participation on watch and in class discussion is expected.
- Late assignment submissions are not accepted.
- The policy on academic accuracy, quoted below, will be strictly followed in this class.

The papers that you submit in this course are expected to be ***your original work***. You must take care to distinguish your own ideas and knowledge from wording or substantive information that you derive from one of your sources. The term “sources” includes not only published primary and secondary material, but also information and opinions gained directly from other people and text that you cut and paste from any site on the Internet.

***The responsibility for learning the proper forms of citation lies with you.***

Quotations must be placed properly within quotation marks and must be cited fully. In addition, all paraphrased material must be acknowledged completely. Whenever ideas or facts are derived from your reading and research, the sources must be indicated. (Harvard *Handbook for Students*, 305)

**Course Calendar:**

Topic	Readings/Assignments Due
<b>Weeks 1 and 2 (12 hours) – onshore at SEA campus in Woods Hole, MA</b>	
Project Development – Literature Review Mentoring Sessions (4)	<b><i>Research Proposal Due</i></b>

<p>Meeting Topics:</p> <ul style="list-style-type: none"> <li>• Testable Hypotheses</li> <li>• Methods Development</li> </ul>	
<b><i>Weeks 3 and 4 (14 hours) – on the ship</i></b>	
<p>Methods Refinement Mentoring Sessions (2) Meeting Topics:</p> <ul style="list-style-type: none"> <li>• Sampling Protocols and Data Recording</li> <li>• Data Analysis Plan Development</li> </ul>	<b><i>Revised Intro/Methods Due</i></b>
<b><i>Week 5 and 6 (14 hours) – on the ship</i></b>	
<p>Data Analysis Mentoring Sessions (2) Meeting Topics:</p> <ul style="list-style-type: none"> <li>• Data Discussion I</li> <li>• Data Discussion II</li> </ul>	<p><b><i>Data Discussion Assignments Due</i></b> <b><i>Draft Results Due</i></b></p>
<b><i>Week 7 and 8 (14 hours) – on the ship</i></b>	
<p>Data Analysis, continued Mentoring Sessions (2) Meeting Topic:</p> <ul style="list-style-type: none"> <li>• Abstract Writing</li> </ul>	<b><i>Final Research Report Due</i></b>